

PATENT ABSTRACTS OF JAPAN

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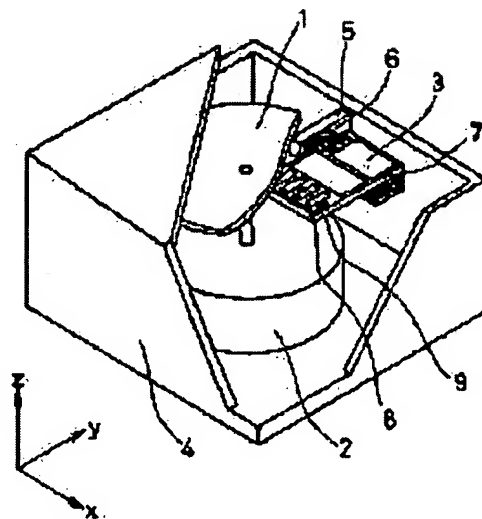
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(54) PICKUP DEVICE AND INFORMATION MEMORY DEVICE

(57)Abstract:

PURPOSE: To obtain a pickup device which is simple in construction, is easy in manufacture and control and is less affected by the electromagnetic interaction between respective electrodes and an information memory device which is formed by using the device and permits ultra-high-density recording.

CONSTITUTION: Cantilevers 9 are provided respectively thereon with probe groups 8 consisting of plural probes on the same substrate 7 and these probes are tracked by finely adjusting the entire part of the substrate 7 in a radial direction of a recording medium 1 by a piezo-element 6 for driving in an X direction. Grounded shielding electrodes are disposed in proximity to the signal electrodes connected to the respective probes to shut off the influence by the electromagnetic interaction between the respective signal electrodes.



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CLAIMS

[Claim(s)]

[Claim 1] The pickup which prepared two or more probe groups possessing two or more probes, the driving means to which the distance of each probe and a sample is changed for said every probe group, a means to detect the distance of at least two probes and samples for said every probe group, the signal electrode connected to each probe of each of said probe group, and the screening electrode which approached said each signal electrode, and was arranged and grounded on the same substrate.

[Claim 2] Two or more probe groups are pickups according to claim 1 prepared on a different cantilever, respectively.

[Claim 3] A signal electrode and a screening electrode are a pickup according to claim 1 arranged by turns on the same substrate, respectively.

[Claim 4] It is the pickup according to claim 1 prepared through the insulating layer by preparing a signal electrode directly on a substrate so that a screening electrode may cover the whole signal electrode except for the probe section in the first half.

[Claim 5] It is the pickup according to claim 1 which, as for a signal electrode, the whole is mostly covered by the insulating layer except for the probe section, and is prepared so that a screening electrode may wrap in a signal electrode.

[Claim 6] A disk-like record medium and a rotation means to rotate said record medium at a predetermined rate, The pickup in which only predetermined distance was prepared by separating to the recording surface of said record medium is provided. In the first half a pickup Two or more probe groups possessing two or more probes, and the driving means to which the distance of each probe and a sample is changed for said every probe group, The information storage device which prepared a means to detect the distance of at least two probes and samples for said every probe group, the signal electrode connected to each probe of each of said probe group, and the screening electrode which approached said each signal electrode, and was arranged and grounded on the same substrate.

[Claim 7] A disk-like record medium and a rotation means to rotate said record medium at a predetermined rate, The pickup in which only predetermined distance was prepared by separating to the recording surface of said record medium, A means to drive said pickup to radial [of said record medium] is provided. In the first half a pickup The information storage device which established two or more probe groups possessing two or more probes, the driving means to which the distance of each probe and a sample is changed for said every probe group, and a means to detect the distance of at least two probes and samples for said every probe group, on the same substrate.

[Claim 8] The information storage device according to claim 7 which prepared the circuit which controls a means to drive a pickup on the same substrate as a probe group.

[Claim 9] Two or more probe groups are information storage devices according to claim 6 or 7 formed on a different cantilever, respectively.

[Claim 10] A cantilever is an information storage device according to claim 9 which has the width of face of extent which the part of the disk-like record medium with which record and playback are performed by the probe group can consider substantially is a flat surface.

[Claim 11] A signal electrode and a screening electrode are an information storage device according to claim 6 arranged by turns on the same substrate, respectively.

[Claim 12] It is the information storage device according to claim 6 formed through the insulating layer by preparing a signal electrode directly on a substrate so that a screening electrode may cover the whole signal electrode except for the probe section in the first half.

[Claim 13] It is the information storage device according to claim 6 which, as for a signal electrode, the whole is mostly covered by the insulating layer except for the probe section, and is formed so that a screening electrode may wrap in a signal electrode.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the information storage device which used the pickup used as the multi-probe head of a scanning probe microscope, or a pickup head of a record regenerative apparatus, and its pickup and in which super-high density record is possible.

[0002]

[Description of the Prior Art] In recent years, the densification of record is demanded with large-capacity-izing of an information storage device, and the miniaturization of equipment. Many researches which produce the pickup which used especially the probe also in the high density record approach in an information storage device using the IC manufacture approaches, such as etching and lithography, are made.

[0003] It explains referring to drawing 8 and drawing 9 which show the configuration about the conventional information storage device. The disk-like record medium 103 which the conventional information storage device rotates at a predetermined rate in drawing 8, The pickup 200 prepared so that a predetermined distance might be separated and it might counter to a record medium 103, The driving gear which consisted of a drive circuit 106 for Z direction coarse adjustments for driving a pickup 200 in the perpendicular direction (a Z direction being called below) to the recording surface of a record medium 103, a Z direction servo circuit 107, and truck servo circuit 108 grade, It consists of the signal-control equipment and the control unit 112 grades which consisted of a tunnel current detector 109 for impressing a predetermined pulse voltage between a probe and a record medium 103, and recording information on a record medium 103, or-reading information, a pulse impression circuit 110, and bias circuit 111 grade.

[0004] The silicon substrate 101 is formed so that the recording surface of a record medium 103 may be countered. Two or more cantilevers 102 which have a probe (shown in drawing 9 for details) at a tip are arranged by one side parallel to radial [of the record medium 103 of a silicon substrate 101]. Moreover, the piezoelectric device 105 is formed in the side which does not counter in the record medium 103 of a silicon substrate 101 so that a coarse adjustment may be possible to a Z direction. This piezoelectric device 105 is used in order to make a cantilever 102 approach into a predetermined range to a record medium 103 in a Z direction. On the other hand, in case only minute distance can curve to a Z direction and cantilever 102 the very thing also performs information record by the probe, a Z direction is made to carry out the minute distance curve of the cantilever 102, and a probe is approached or contacted to the recording surface of a record medium 103. In this condition, information is recorded on a record medium 103 by impressing a pulse voltage between a probe and a record medium 103. On the other hand, in the case of information read-out by the probe, a probe is made to scan in accordance with the bit-data train 104 written in the record medium 103, and information is read.

[0005] Next, the detailed configuration of a cantilever 102 is shown in drawing 9. In addition, with the condition which shows in drawing 8, top and bottom shall have reversed the cantilever 102 in drawing 9. As shown in drawing 9 R> 9, a cantilever 102 is bimorph structure which consists of piezo electric

crystals 117a and 117b fundamentally. In drawing 9 and on piezo electric crystal 117a, Electrodes 119a and 119b are formed, and Electrodes 118a and 118b are formed in the bottom of piezo electric crystal 117b. The electrode 120 is formed among piezo electric crystals 117a and 117b. On Electrodes 119a and 119b, the screening electrode 115 is formed through the insulating layer 116, further, on a screening electrode 115, it pulls out through an insulating layer 116, and the electrode 113 is formed. And the probe 114 is formed on the drawer electrode 113. An electrical potential difference can be impressed to each electrodes 118a, 118b, 119a, 119b, and 120 from the pad section 121 at arbitration, respectively. By impressing a predetermined electrical potential difference to each electrode, piezo electric crystals 117a and 117b can deform, and complicated motions, such as telescopic motion and torsion, can be carried out to a cantilever 102. By driving one cantilever 102 at a time in this way, two or more trucks can be written by one probe 114.

[0006] Next, it explains, referring to drawing 10 and drawing 11 which show the configuration for another conventional information storage device. In drawing 10 $R > 0$, the disk-like record medium 122 is connected with the shaft of the slewing gear 123 formed caudad, and rotates at a predetermined rate. A pickup 124 is arranged between a record medium 122 and a slewing gear 123, and informational record and playback are performed by approaching or contacting the probe prepared in each cantilever section 127 to the recording surface of a record medium 122. What expanded a part of this cantilever section 127 is shown in drawing 11. It sets to drawing 11 and they are each cantilevers 132a and 132b... Upwards, many (for example, about 100 pieces) probes 128 are formed. The pitch between each probe 128 is 0.35 micrometers, and is one cantilevers 132a and 132b... Width of face is about 35 micrometers, respectively. In addition, each cantilevers 132a and 132b ... Although about 100 probes 128 are formed as mentioned above upwards, only the part is shown in drawing. Each probe 128 is connected to the information processing circuit (not shown). moreover, each cantilevers 132a and 132b ... respectively -- Electrodes 129a and 129b ..., and 131a and 131b ... connects -- having -- **** -- between Electrodes 129a and 131a and between Electrodes 129b and 131b -- respectively -- electrostatic force -- ** and others or ***** -- each cantilevers 132a and 132b ... is driven.

[0007]

[Problem(s) to be Solved by the Invention] With the configuration of the conventional information storage device shown in drawing 8 and drawing 9, complicated actuation needed to be carried out to all cantilevers, and it had the trouble that the structure and control cannot but become complicated. Moreover, with the configuration of the conventional information storage device shown in drawing 10 and drawing 11, although simplified, since one probe was assigned to each truck, the distance between each probe had to become very narrow, therefore the drive structure of each cantilever had to wire in the pitch also with a very fine signal electrode, and had the trouble that manufacture was very difficult. Furthermore, since two or more signal electrodes were arranged in parallel and arranged, it also had the trouble that a noise will ride on a regenerative signal by each inter-electrode electromagnetic-like interaction.

[0008] It is made in order that this invention may solve the trouble of the above-mentioned conventional information storage device, and structure is easy, manufacture and control are easy, and it aims at offering the information storage device which used the pickup and it with little effect by each inter-electrode electromagnetic-like interaction and in which super-high density record is possible.

[0009]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the pickup of this invention Two or more probe groups possessing two or more probes, and the driving means to which the distance of each probe and a sample is changed for said every probe group, It is constituted so that a means to detect the distance of at least two probes and samples for said every probe group, the signal electrode connected to each probe of each of said probe group, and the screening electrode which approached said each signal electrode, and was arranged and grounded may be prepared on the same substrate. As for two or more probe groups, in the above-mentioned configuration, being prepared on a different cantilever is desirable respectively. Moreover, as for a signal electrode and a screening electrode, in the above-mentioned configuration, being arranged by turns on the same substrate is

desirable respectively. Moreover, in the above-mentioned configuration, a signal electrode is directly prepared on a substrate and it is desirable to be prepared through an insulating layer, so that a screening electrode may cover the whole signal electrode except for the probe section in the first half. Moreover, in the above-mentioned configuration, except for the probe section, the whole is mostly covered by the insulating layer, and, as for a signal electrode, as for a screening electrode, being prepared so that a signal electrode may be wrapped in is desirable.

[0010] Moreover, the information storage device using the pickup of this invention A disk-like record medium and a rotation means to rotate said record medium at a predetermined rate, The pickup in which only predetermined distance was prepared by separating to the recording surface of said record medium is provided. In the first half a pickup Two or more probe groups possessing two or more probes, and the driving means to which the distance of each probe and a sample is changed for said every probe group, It is constituted so that a means to detect the distance of at least two probes and samples for said every probe group, the signal electrode connected to each probe of each of said probe group, and the screening electrode which approached said each signal electrode, and was arranged and grounded may be prepared on the same substrate. Moreover, another information storage device using the pickup of this invention A disk-like record medium and a rotation means to rotate said record medium at a predetermined rate, The pickup in which only predetermined distance was prepared by separating to the recording surface of said record medium, A means to drive said pickup to radial [of said record medium] is provided. In the first half a pickup It is constituted so that two or more probe groups possessing two or more probes, the driving means to which the distance of each probe and a sample is changed for said every probe group, and a means to detect the distance of at least two probes and samples for said every probe group may be established on the same substrate. In the above-mentioned configuration, it is desirable to prepare the circuit which controls a means to drive a pickup on the same substrate as a probe group. Moreover, as for two or more probe groups, in the above-mentioned configuration, being prepared on a different cantilever is desirable respectively. Moreover, as for a cantilever, in the above-mentioned configuration, it is desirable to have the width of face of extent which the part of the disk-like record medium with which record and playback are performed by the probe group can consider substantially is a flat surface. Moreover, as for a signal electrode and a screening electrode, in the above-mentioned configuration, being arranged by turns on the same substrate is desirable respectively. Moreover, in the above-mentioned configuration, a signal electrode is directly prepared on a substrate and it is desirable to be prepared through an insulating layer, so that a screening electrode may cover the whole signal electrode except for the probe section in the first half. Moreover, in the above-mentioned configuration, except for the probe section, the whole is mostly covered by the insulating layer, and, as for a signal electrode, as for a screening electrode, being prepared so that a signal electrode may be wrapped in is desirable.

[0011]

[Function] As mentioned above, since according to the pickup and information storage device of this invention two or more probes are made into one probe group and the distance of each probe and a sample is changed for every probe group, it is not necessary to make each probe drive independently, respectively, and a drive is simplified. Moreover, since the distance of at least two probes and samples is detected for every probe group, even if the cantilever in which the probe group is prepared inclines, risk of saying that some probes which constitute a probe group collide with a sample, and are damaged will decrease extremely. Furthermore, since the screening electrode grounded by approaching the signal electrode and each signal electrode which were connected to each probe of each probe group was prepared, the electromagnetic-like effect produced between each signal electrode is reduced. Furthermore, the electromagnetic-like effect produced between each signal electrode is further reduced through an insulating layer by preparing a signal electrode directly on a substrate by preparing a screening electrode so that the whole signal electrode may be covered except for the probe section. Furthermore, the electromagnetic-like effect produced between signal electrodes is intercepted nearly completely by covering the whole for a signal electrode by the insulating layer mostly except for the probe section, and wrapping a signal electrode in a screening electrode. Furthermore, by preparing two or more probe groups on a cantilever different, respectively, width of face of each cantilever can be

made small, and the distance of each probe and sample front face which are prepared on each cantilever is kept almost the same. Furthermore, when the part of the disk-like record medium with which record and playback are performed by the probe group makes a cantilever the width of face of extent it can be considered substantially that is a flat surface, the distance on each probe and the front face of a sample is kept almost the same. Moreover, in order that the information storage device of this invention may drive the whole pickup and may perform tracking, while making it expand and contract directly, or it becoming unnecessary to twist each cantilever and simplifying the structure of a cantilever as a result, the number of the probe prepared in each cantilever and electrodes can be reduced, and the control and manufacture become easy.

[0012]

[Example] One suitable example of the pickup of this invention and the information storage device using it is explained referring to a drawing. Drawing 1 is the perspective view showing the configuration of the information storage device which used the pickup of this invention, and it. The disk-like record medium 1 is constituted in drawing 1 by the dielectric layer formed for example, on the conductive base material. In the case of this example, the diameter is about 10mm, using a single crystal Si as a conductive base material. The rotation record medium 1 is connected with the shaft of the rolling mechanism 2 which consisted of servo motors etc., and rotates at a predetermined rate. Between the record medium 1 and the rolling mechanism 2, to the recording surface of a record medium 1, a pickup 3 separates predetermined distance and is prepared. These record media 1, the rolling mechanism 2, and the pickup 3 grade are prepared in the interior of a housing 4, and the rolling mechanism 2 is being fixed to the base of a case 4. Moreover, the pickup supporter 5 is being fixed to the wall surface of a housing 4. The end is being fixed to the pickup supporter 5 for the pickup 3 through X direction drive piezo 6. An electrical potential difference is impressed to direction drive [of X] piezo 6, and a pickup 3 is made to move slightly in the direction of X by making X direction drive piezo 6 expand and contract. The pickup 3 has two or more probe groups 8 which consist of two or more probes prepared on the same substrate 7 at two or more cantilevers 9 and the end of each cantilever 9.

[0013] Next, the detailed configuration of a pickup 3 is shown in drawing 2. The substrate 7 consists of for example, single crystals Si etc. The probe group 8 (8a-8d) consists of two or more probes, and the pitch between each probes in each probe groups 8a-8d is about 3.5 micrometers. Each probe groups 8a-8d are formed in the top face of a cantilever 9 (9a-9d), respectively. Each cantilevers [9a-9d] width of face is about 35 micrometers, and ten probes are prepared on each cantilever 9a-9d, respectively (in addition, only the part is shown in drawing 2). Since the profile irregularity of a record medium 1 is about 1.5nm when a single crystal Si is used, if each cantilevers [9a-9d] width of face is set to 35 micrometers, it can be considered substantially that it is flat in the meantime. Therefore, if Cantilevers 9a-9d and a record medium 1 are made parallel, all the distance of the each of ten probes and the recording surface of a record medium 1 in each probe groups 8a-8d on each cantilever 9a-9d will become equal.

[0014] Each cantilevers 9a-9d are driven with a driving gear (not shown), respectively, and each probe groups 8a-8d prepared in the each cantilevers [9a-9d] top face by that cause are moved in the direction of a vertical to the recording surface of a record medium 1. Each cantilevers 9a-9d are connected to the cantilever control circuit 10 for cantilever control and signal processing, respectively, and the cantilever control circuit 10 performs signal processing from each probe, tracking information signal processing, gap control of each probe, a record medium 1, and a between, etc. The direction drive of X piezo control circuit 11 drives X direction drive piezo 6 corresponding to the tracking information signal sent from the cantilever control circuit 10.

[0015] Next, the 1st-example Cantilevers [9a-9d] configuration is shown in drawing 3. Drawing 3 is some plans of for example, cantilever 9b. In addition, since the member which attached the same number as drawing 2 in drawing 3 is substantially the same, the explanation is omitted. A probe 12 is one of the probes which constitute probe group 8b shown in drawing 2. Although ten probes are prepared on each cantilever 9a-9d, respectively as stated previously, a part of the probe is shown in drawing 3. Although Probes 13a and 13b are also a probe 12 and a probe which constitutes probe group

8b similarly, it connects with a gap detector (not shown) and probes 12 differ in the point of being used also in order to detect spacing with the record medium 1 shown in drawing 1 . a signal electrode 14 -- respectively -- Probes 12, 13a, and 13b -- it connects with ... and the information read by each probe and the information recorded by each probe are transmitted. By arranging the screening electrode 15 grounded with wiring which is not illustrated each signal electrode 14 and by turns, the electromagnetic-like interaction between each signal electrode 14 can be reduced.

[0016] Next, the 2nd-example Cantilevers [9a-9d] configuration is shown in drawing 4 and drawing 5 . Drawing 4 is some plans of for example, cantilever 9b. Moreover, drawing 5 is an A-A sectional view in drawing 4 . In addition, since the member which attached the same number as drawing 2 and drawing 3 in drawing 4 and drawing 5 is substantially the same, the explanation is omitted. The 2nd example shown in drawing 4 differs in the 1st example shown in drawing 3 in the point made into structure which covers a signal electrode 14 with a screening electrode 15 except the probe section. In drawing 5 , a screening electrode 15 consists of aluminum etc. and is grounded with wiring which is not illustrated. Each signal electrode 14 prepared on cantilever 9b is constituted so that it may be covered by the insulating layer 16 which consisted of SiO₂ grades and the whole except the probe section may be covered with a screening electrode 15 from on the. Consequently, it becomes the structure to which some screening electrodes 15 entered between each signal electrode 14 as shown in drawing 5.

[0017] Furthermore, the 3rd-example Cantilevers [9a-9d] configuration is shown in drawing 6 . Since some plans of cantilever 9b concerning the 3rd example are substantially the same as that of drawing 4 , illustration is omitted. Drawing 6 is another example of the A-A cross section in drawing 4 . In addition, since the member which attached the same number as drawing 2 to drawing 5 in drawing 6 is substantially the same, the explanation is omitted. The 3rd example shown in drawing 6 differs in the 2nd example shown in drawing 5 in the point of having wrapped in each signal electrode 14 completely with the screening electrode 15. That is, in the 3rd example shown in drawing 6 , some screening electrodes 15 are formed on cantilever 9b, the signal electrode 14 covered with the insulating layer 16 is formed on this screening electrode 15, and it is formed so that a screening electrode 15 may cover a signal electrode 14 from on that further. Thus, although structure becomes a little complicated by constituting, the electromagnetic interaction between signal electrodes 14 can be intercepted nearly completely.

[0018] Next, actuation of record and playback of the pickup of this invention is explained using drawing 7 . Drawing 7 shall be the perspective view showing a part of cantilever 9b, and the thing and top and bottom which were shown in drawing 3 shall have reversed it. Moreover, since the member which attached the same number as drawing 3 in drawing 7 is substantially the same, the explanation is omitted. In drawing 7 , a truck 17 is the concentric circular information pit train recorded on the recording surface of the disk-like record medium 1. Probes 12, 13a, and 13b ... Spacing is 3.5 micrometers and spacing of each truck 17 is set to 0.35 micrometers. That is, it is constituted so that information may be written on ten trucks by one probe. Probes 12, 13a, and 13b ... Tracking makes cantilever 9b drive intricately combining telescopic motion, torsion, etc. like before, and is not performed, but is performed by making the pickup 3 whole move slightly by X direction drive piezo 6. At this time, they are Probes 12, 13a, and 13b... Direction drive [of X] piezo 6 is made to move slightly, acting as the monitor of the reinforcement of the signal acquired from a probe 12 in order to perform tracking certainly, and a probe 12 is continuously moved to the location where the maximum reinforcement is obtained. The piezo control circuit 11 on a pickup 3 performs such control.

[0019]

[Effect of the Invention] As mentioned above, since according to the pickup and information storage device of this invention it constituted so that two or more probes might be made into one probe group and the distance of each probe and a sample might be changed for every probe-group, it is not necessary to make each probe drive independently, respectively, and a drive can be simplified. Moreover, since it constituted so that the distance of at least two probes and samples might be detected for every probe group, even if the cantilever in which the probe group is prepared inclines, it will have the effectiveness that risk of saying that some probes which constitute a probe group collide with a sample, and are

damaged decreases extremely. Furthermore, since the screening electrode grounded by approaching the signal electrode and each signal electrode which were connected to each probe of each probe group was prepared, the electromagnetic-like effect produced between each signal electrode can be reduced. Furthermore, a signal electrode is directly prepared on a substrate, and through an insulating layer, a screening electrode is that of ** prepared so that the whole signal electrode may be covered except for the probe section, and can reduce further the electromagnetic-like effect produced between each signal electrode. Furthermore, since it constituted so that the whole might be mostly covered for a signal electrode by the insulating layer except for the probe section and a signal electrode might be wrapped in a screening electrode, the electromagnetic-like effect produced between signal electrodes can be intercepted nearly completely. Furthermore, since two or more probe groups were prepared on a cantilever different, respectively, width of face of each cantilever can be made small, and the distance of each probe and sample front face which are prepared on each cantilever can be kept almost the same. Furthermore, a cantilever can keep almost the same the distance on each probe and the front face of a sample by considering as the width of face of extent which can consider substantially that the part of the disk-like record medium with which record and playback are performed by the probe group is a flat surface. Moreover, it can reduce the number of the probe prepared in each cantilever, and electrodes, and can make the control and manufacture easy while making it expand and contract directly, or it becoming unnecessary to twist each cantilever and being able to simplify the structure of a cantilever as a result, since the information storage device of this invention was constituted so that the whole pickup might be driven and tracking might be performed.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The perspective view showing the configuration of one example of the pickup of this invention, and an information storage device

[Drawing 2] The perspective view showing the detailed configuration of the pickup in the example shown in drawing 1

[Drawing 3] The 1st example of the pickup of this invention is the plan showing a configuration a part.

[Drawing 4] The plan showing the configuration of a part of 2nd example of the pickup of this invention

[Drawing 5] The sectional view showing the configuration of a part of 2nd example of the pickup of this invention

[Drawing 6] The sectional view showing the configuration of a part of 3rd example of the pickup of this invention

[Drawing 7] The explanatory view of one example of the pickup of this invention of operation

[Drawing 8] The perspective view showing the configuration of the conventional information storage device

[Drawing 9] The perspective view showing the configuration of the conventional pickup shown in drawing 8

[Drawing 10] The perspective view showing the configuration of another conventional information storage device

[Drawing 11] The top view showing the configuration of the conventional pickup shown in drawing 10

[Description of Notations]

1 : Disk-like Record Medium

2 : Rolling Mechanism

3 : Pickup

4 : Case

5 : Pickup Supporter

6 : Direction Drive PIEZO of X

7 : Substrate

8a-8d, 12, 13a, 13b : Probe

9a-9d : Cantilever

10 : Cantilever Control Circuit

11 : Piezo Control Circuit

14 : Signal Electrode

15 : Screening Electrode

16 : Insulating Layer

17 : Truck

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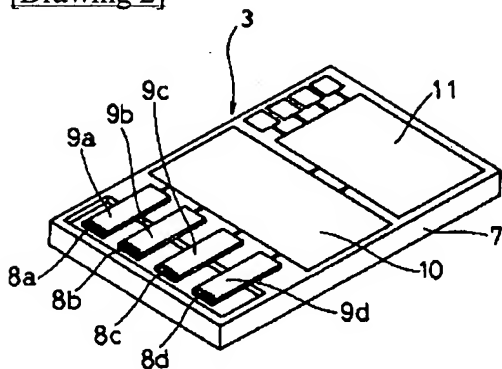
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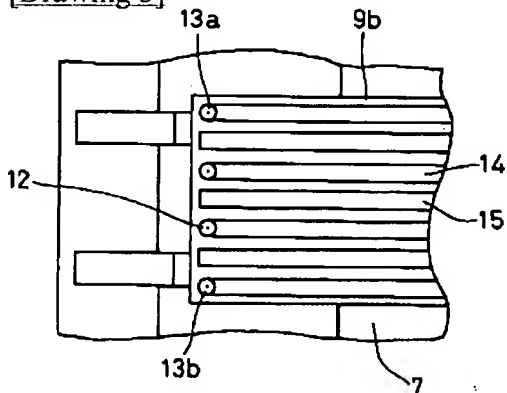
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DRAWINGS

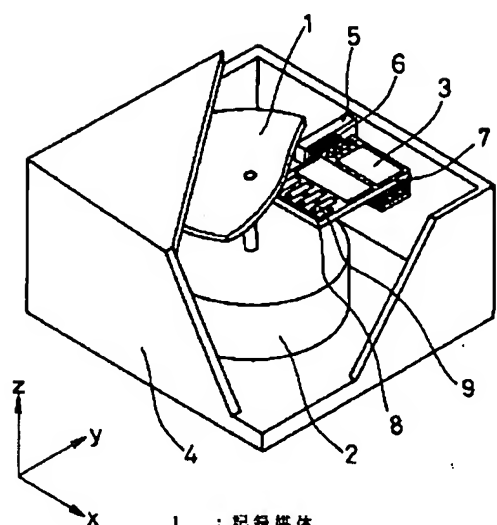
[Drawing 2]



[Drawing 3]

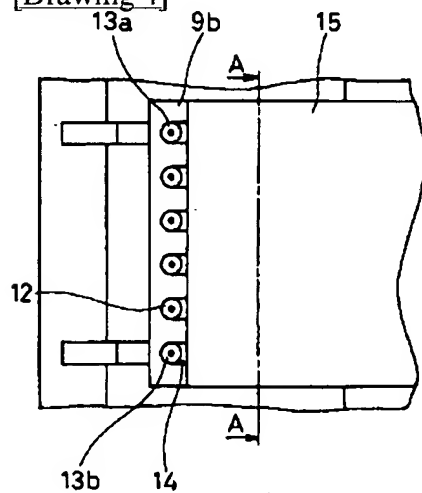


[Drawing 1]

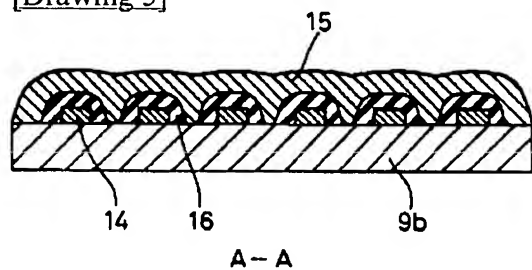


- 1 : 記録媒体
- 2 : 回転機構
- 3 : ピックアップ装置
- 4 : 筐体
- 5 : ピックアップ装置支持部
- 6 : X方向駆動ピエゾ
- 7 : 基板
- 8 : 探針
- 9 : カンチレバー

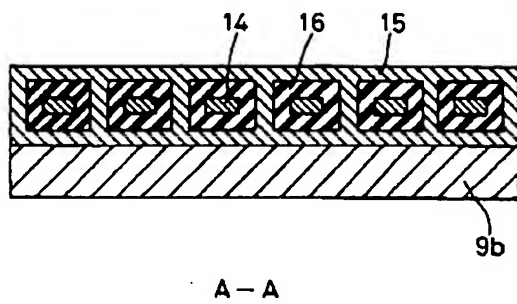
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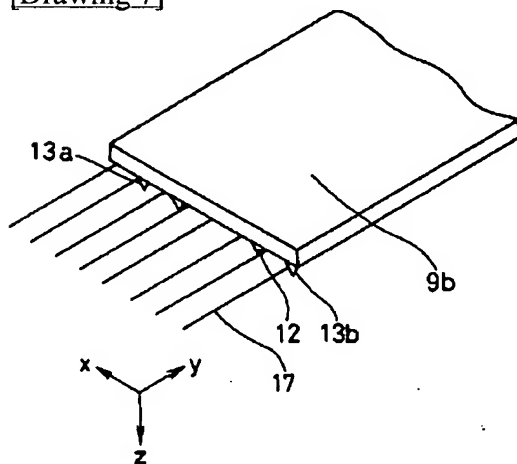
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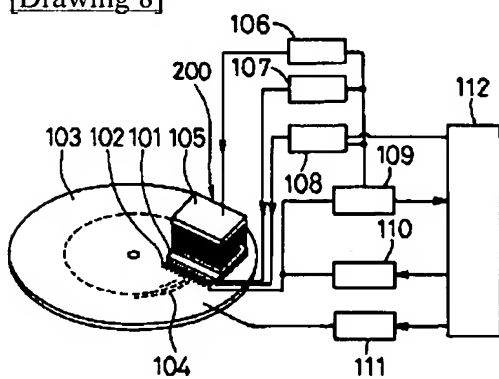
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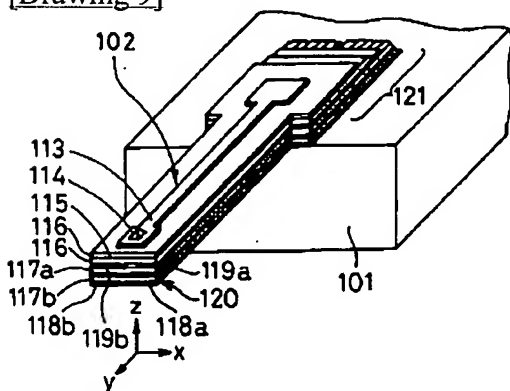
[Drawing 7]



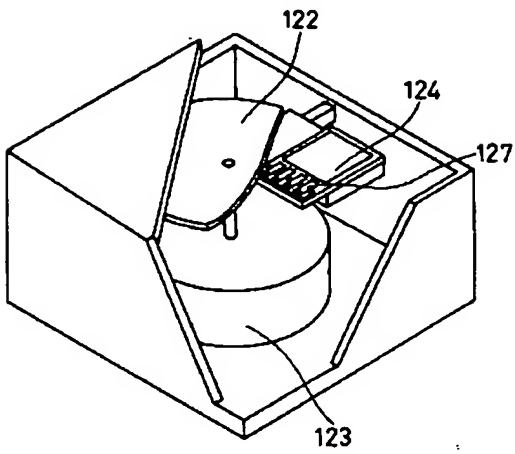
[Drawing 8]



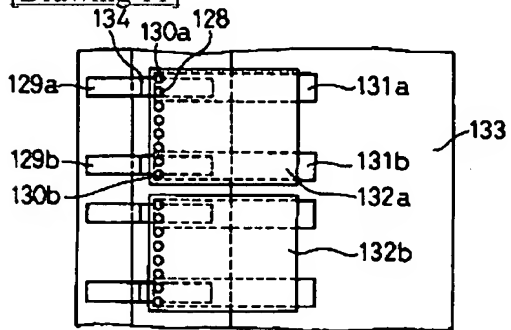
[Drawing 9]



[Drawing 10]



[Drawing 11]



[Translation done.]